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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,215	11/26/2003	Michael O. Polley	TI-36036	8507

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EXAMINER	
GHULAMALI, QUTBUDDIN	
ART UNIT	PAPER NUMBER
2611	

NOTIFICATION DATE	DELIVERY MODE
05/27/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@ti.com

Office Action Summary	Application No.	Applicant(s)	
	10/723,215	POLLEY ET AL.	
	Examiner	Art Unit	
	Qutbuddin Ghulamali	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 January 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11,13-22,25 and 26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,13-22,25 and 26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is responsive to the Appeal Brief filed 1/19/2010.

Response to Appeal Brief

2. Applicant's request for reconsideration of the finality of the rejection of the last Office Action is considered, therefore, the finality of that action is withdrawn.

In view of the Appeal Brief filed on 1/19/2010, PROSECUTION IS HEREBY REOPENED.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) File a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) Initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

Chieh M. Fan (SPE). _____

Response to Arguments

3. Applicant's arguments with respect to claims 1-11, 13-22, 25 and 26, have been considered but are moot in view of the new ground(s) of rejection. The rejection based on new art follows.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the seOK no problemcond paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 25 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 25 recites the limitation "based on the number of data transmissions" in line 7-8. The examiner cannot find any correlation with the number of data transmission vs. providing power to each antenna. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-3, 7-11, 13, 17-20 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Catreux et al (US Pub. 2005/0053170) in view of Jasper et al (USP 6,201,955)

Regarding claim 1, Catreux discloses a multiple-antenna wireless (fig. 2A, 2B) device that communicates with a single antenna device (it is obvious that in order to communicate a device or multiple or set of devices has to be enabled in order to communicate) (page 4, section 0033, 0035) across a spectrum having a plurality of sub-channels (substreams or tones), comprising:

a plurality of antennas through the multiple-antenna wireless device communicates with a single antenna enabled device (fig. 3, 4), each antenna of the plurality of antennas communicates with the single antenna enabled device via an associated communication pathway between a subset (antenna chain, page 2, sections 0090, 0010; page 4, section 0032) of the plurality of antennas on the multiple antenna wireless device and an antenna on single antenna device (page 4, sections 0033, 0035, 0036; page 7, sections 0064-0068; page 8, section 0072, 0075, 0076, 0080). Catreux, however, does not explicitly disclose, sub-channel power analysis logic coupled to the plurality of antennas and adapted to determine a communication quality for at least two communication pathways and determine which communication pathway has a highest communication quality on a sub-channel by sub-channel basis; and

diversity selection logic coupled to the sub-channel power analysis logic and adapted to determine a weighting vector for an associated antenna based on the highest

communication quality, wherein the weighting vector specifies a relative transmission power for each sub-channel for the associated antenna.

However, Jasper, in a similar field of endeavor, discloses sub-channel power analysis logic (spectrum analyzer 314, processor 316) coupled to the plurality of antennas and adapted to determine a communication quality for at least two communication pathways and determine which communication pathway has a highest communication quality on a sub-channel by sub-channel basis (col. 4, lines 50-67; page 5, lines 1-10, 13-47; page 8, lines 22-40, 52-67; col. 9, lines 35-51); and

diversity selection logic coupled to the sub-channel power analysis logic and adapted to determine an antenna weighting vector for an associated antenna based on the highest communication quality, wherein antenna weighting vector specifies a relative transmission power for each sub-channel for the associated antenna (col. 4, lines 50-67; page 5, lines 1-10, 13-47; page 8, lines 22-40, 52-67; col. 9, lines 35-51). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use analysis technique to measure signal power in sub channels (sub channel by sub channel) to determine the highest communication quality (signal to noise ratio) and diversity adapted to determine antenna chain weighting vector wherein weights are applied to signal coming from branch of multiple element adaptive antenna array specify transmission power for each sub-channel for an associated antenna as taught by Jasper in the art of Catreux because it can minimize the total radiated power while maintaining acceptable quality levels for all channels.

Regarding claim 2, Catreux discloses representing the weighting vector using a plurality of bits, (the input data sequence is encoded into sequence of symbols of digitized values or bits) each bit corresponding to a different sub-channel, and each bit indicating whether an antenna associated with the weighting vector is used to transmit data on the corresponding sub-channel (page 3, section 0031).

Regarding claim 3, Catreux and Jasper combined discloses all limitations of the claim except does not explicitly disclose weighting vector in a ratio format; and ratio format specifies an amount of power to be applied to an antenna associated with the weighting vector for each sub-channel. The examiner takes the position that values or vector weights can be represented in as a ratio and is well known in the art. As per an amount of power to be applied to an antenna associated with the weighting vector for each sub-channel, Jasper however, discloses an amount of power to be applied to an antenna associated with the weighting vector for each sub-channel (page 3, section 0027, lines 15-27; page 4, lines 1-2, section 0028, lines 14-29, section 0029, lines 4-8, 63, section 0030). It would have been obvious to a person of ordinary skill in the art to use weighting vector specify transmission power for each sub-channel for an associated antenna as taught by Jasper in the art of Catreux because it can minimize the total radiated power while maintaining acceptable quality levels for all channels.

Regarding claim 7, Catreux discloses wireless device wirelessly communicate with a plurality of wireless stations (see figs. 3, 4, 5A, 5B).

Regarding claim 8, Catreux discloses signals are divided (splitter 218) coupled to diversity logic to reproduce signals to be transmitted (fig. 2A, 2B; page 4, section 0036).

8. Claims 4-6, 14-16, 21, 22, 25, 26 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Catreux et al (US Pub. 2005/0053170) in view of Jasper et al (USP 6,201,955) and further in view of Horng et al (US Pub. 2004/0032910).

Regarding claims 4-6, 14-16, 21-22, 25-26, Catreux and Jasper combined discloses substantially all limitations of the claim above except does not explicitly disclose providing power to each antenna chain of the plurality of antennas based on the number of transmissions since the communication quality was last determined. However, Horng in a similar field of endeavor discloses providing power to each antenna chain (power allocated at the ith group, that is, a plurality of antenna chain or groups of antenna) of the plurality of antennas based on the number of transmissions since the communication quality was last determined (page 2, section 0017-0022). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to providing power to each antenna chain of the plurality of antennas based on the number of transmissions since the communication quality was last determined as taught by Horng in the system of Catreux and Jasper because it can adaptively reduce signal distortion and fading effects due to multi-path in transmission of broadcast signals.

Regarding claim 9, Catreux discloses, a method for a multiple antenna device (fig. 2A, 2B) communicating with a single antenna device comprising:
receiving data, transmitted from the single antenna device (a first wireless device) to a second wireless device, using a plurality of antennas, wherein each antenna of the

plurality of antennas communicates with the single antenna device (first wireless device) via an associated communication pathway (page 4, sections 0033, 0035, 0036; page 7, sections 0064-0068; page 8, section 0072, 0075, 0076, 0080);

determining a plurality of channel characteristics (page 2, section 0009) associated with each of the plurality of antennas (page 2, sections 0009, 0010);

replicating a single antenna transmit signal in order to permit the second wireless device to communicate with the single-antenna enabled wireless device (identical copies of transmitting signals are transmitted employing diversity such as in MIMO communication using multiple transmit and receive antennas and therefore is implicitly implied);

representing the antenna weighting vector using a plurality of bits, (the input data sequence is encoded into sequence of symbols of digitized values or bits) each bit corresponding to a different sub-channel, and each bit indicating whether an antenna associated with the weighting vector is used to transmit data on the corresponding sub-channel (Note: the Industry Standard, such as IEEE 802.11a, b, g describes protocols for use in OFDM and in DSSS wherein communication between two devices is enabled by splitting into several parts or sub channels each byte of data to be transmitted for transmission concurrently or simultaneously on different frequencies over sub-channels of a wide frequency spectrum, is well known in the art of communication) (page 1, sections 0003, 0004, 0005);

for each communication pathway combining a transmission signal in each transmit antenna chain with the weighting vector for that antenna chain to form a weighted

transmission signals (RF) (abstract; page 1, section 0002; page 2, section 0009, 0010), and concurrently (simultaneously) transmitting the weighted transmission signal from the second wireless device to the first wireless (from one device to another) device via a plurality of communication pathways (page 1, section 0005; page 6, sections 0049, 0050). Catreux however, does not explicitly disclose on a per sub-channel basis, computing an antenna chain (array) weighting vector for each antenna for each sub-channel based on the channel characteristics, for each communication pathway, However, Jasper, in a similar field of endeavor, discloses sub-channel power analysis logic (spectrum analyzer 314, processor 316) coupled to the plurality of antennas and adapted to determine a communication quality for at least two communication pathways and determine which communication pathway has a highest communication quality on a sub-channel by sub-channel basis (col. 4, lines 49-67; col. 5, lines 1-10, 13-47; col. 8, lines 22-40, 52-67; col. 9, lines 35-51). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use analysis technique to measure signal power in sub channels (sub channel by sub channel) to determine the highest communication quality (signal to noise ratio) and diversity adapted to determine antenna chain weighting vector wherein weights are applied to signal coming from branch of multiple element adaptive antenna array specify transmission power for each sub-channel for an associated antenna as taught by Jasper in the art of Catreux because it can minimize the total radiated power while maintaining acceptable quality levels for all channels.

Regarding claim 10, Catreux discloses data transmission from one wireless device to a plurality of devices and receives data from a plurality of wireless devices (see figs. 3, 4, 5A, 5B).

As per claim 11, Catreux discloses each weighting vector specifies a relative transmission power for each sub-channel (page 6, section 0059).

Regarding claims 13, Catreux discloses, a method for a multiple antenna device (fig. 2A, 2B) communicating with a single antenna device comprising:
receiving data, transmitted from the single antenna device (a first wireless device) to a second wireless device, using a plurality of antennas, wherein each antenna of the plurality of antennas communicates with the single antenna device (first wireless device) via an associated communication pathway (page 4, sections 0033, 0035, 0036; page 7, sections 0064-0068; page 8, section 0072, 0075, 0076, 0080);
for each communication pathway combining a transmission signal in each transmit antenna chain with the weighting vector for that antenna chain to form a weighted transmission signals (RF) (abstract; page 1, section 0002; page 2, section 0009, 0010), and concurrently (simultaneously) transmitting the weighted transmission signal from the second wireless device to the first wireless (from one device to another) device via a plurality of communication pathways (page 1, section 0005; page 6, sections 0049, 0050). Catreux, however, does not explicitly disclose determining a plurality of channel characteristics associated with each antenna chain in each sub-channel; representing an antenna weighting vector in a ratio format (signal to noise ratio referred to as in the alternate a measure of communication quality); wherein the ration format specifies the

amount of power to be applied to an antenna chain associated with the antenna chain weighting vector for the antenna chain for each sub-channel.

However, Jasper, in a similar field of endeavor, discloses sub-channel power analysis logic (spectrum analyzer 314, processor 316) coupled to the plurality of antennas and adapted to determine a channel communication quality channel characteristics associated with each antenna chain in each sub-channel (col. 4, lines 50-67; col. 5, lines 1-10, 13-47; col. 8, lines 22-40, 52-67; col. 9, lines 35-51); and

representing an antenna weighting vector in a ration format (signal to noise ratio); wherein the ration format specifies the amount of power to be applied to an antenna chain associated with the antenna chain weighting vector for the antenna chain for each sub-channel (col. 4, lines 50-67; col. 5, lines 1-10, 13-47; col. 8, lines 22-40, 52-67; col. 9, lines 35-51). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use analysis technique to measure signal power in sub channels (sub channel by sub channel) to determine the highest communication quality (signal to noise ratio) and diversity adapted to determine antenna chain weighting vector wherein weights are applied to signal coming from branch of multiple element adaptive antenna array specify transmission power for each sub-channel for an associated antenna as taught by Jasper in the art of Catreux because it can minimize the total radiated power while maintaining acceptable quality levels for all channels.

determining a plurality of channel characteristics (page 2, section 0009) associated with each antenna chain in each sub-channel (page 2, sections 0009, 0010).

As to claim 17, Catreux discloses characteristics comprise a signal to noise ratio (page 3, section 0029).

Regarding claim 18, Catreux discloses a system comprising:

an access point having a plurality of antennas (figs. 2A, 2B);

a wireless station in communication with the access point via a single antenna in the wireless station (page 4, section 0035, 0036), wherein the plurality of antennas in the access point receive a data signal from the single antenna in the wireless station via a plurality of communication pathways [(fig. 3, 4), each antenna of the plurality of antennas communicates with the single antenna enabled device via an associated communication pathway between a subset (antenna chain, page 2, sections 0090, 0010; page 4, section 0032) of the plurality of antennas on the multiple antenna wireless device and an antenna on single antenna device (page 4, sections 0033, 0035, 0036; page 7, sections 0064-0068; page 8, section 0072, 0075, 0076, 0080)];

wherein the access point reproduces a data transmission signal, for each communication pathway combining a transmission signal in each transmit antenna chain with the weighting vector for that antenna chain to form a weighted transmission signals (RF) (abstract; page 1, section 0002; page 2, section 0009, 0010), and concurrently (simultaneously) transmitting the weighted transmission signal from the second wireless device to the first wireless (from one device to another) device via a plurality of communication pathways (page 1, section 0005; page 6, sections 0049, 0050). Catreux does not explicitly disclose wherein the access point determines channel characteristics and antenna chain weighting vector for each antenna of the

plurality of antennas, each antenna chain weighting vector being indicative of an amount of power to be provided to each sub-channel. However, Jasper in a similar field of endeavor discloses wherein the access point determines channel characteristics and a antenna chain weighting vector for each antenna of the plurality of antennas, each antenna chain weighting vector being indicative of an amount of power to be provided to each sub-channel (col. 4, lines 50-67; page 5, lines 1-10, 13-47; page 8, lines 22-40; col. 9, lines 35-51). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use analysis technique to measure signal power in sub channels (sub channel by sub channel) to determine the highest communication quality (signal to noise ratio) and diversity adapted to determine antenna chain weighting vector wherein weights are applied to signal coming from branch of multiple element adaptive antenna array specify transmission power for each sub-channel for an associated antenna as taught by Jasper in the art of Catreux because it can minimize the total radiated power while maintaining acceptable quality levels for all channels.

Regarding claim 19, the Industry Standard, such as IEEE 802.11a, b, g describes protocols for use in OFDM and in DSSS wherein communication between two devices is enabled by splitting into several parts or sub channels each byte of data to be transmitted for transmission concurrently or simultaneously on different frequencies over sub-channels of a wide frequency spectrum, is well known in the art of communication (col. 5, lines 35-67; col. 6, lines 42-67).

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Qutbuddin Ghulamali whose telephone number is (571)-272-3014. The examiner can normally be reached on Monday-Friday, 7:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

QG.
May 7, 2010.

/CHIEH M FAN/
Supervisory Patent Examiner, Art Unit 2611